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EXAMINER

SHUTE, DOUGLAS M

ART UNIT PAPER NUMBER

2121

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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## Office Action Summary

Application No.

10/670,173

Applicant(s)

MOSELLI ET AL.

Examiner

Douglas M. Shute

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9, 11-18 and 20 is/are rejected.
- 7) ☒ Claim(s) 4, 10 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/23/03</u> | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

1. Claims 1-20 are presented for examination.

***Specification***

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

3. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

4. The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure

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concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The specific difficulty here is that the Abstract is too long. Correction is required.

6. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

7. The following title is suggested: System control based on deviation between system measured value and corresponding model estimated value.

***Drawings***

8. The drawings are objected to because of the following:

1) Figure 1 does not show block 3.

2) In Figure 1, the "+" and "-" designations at element E are unclearly positioned.

3) In Figure 1, block boundaries (e.g., for blocks 1 and 2) are difficult to distinguish from signal lines.

4) In Figure 4, the arrow designated element 11 is unclear. It would be clarified if it were labeled something like "To element 11".

9. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional

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replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

10. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11. Claims 7 and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, claims 7 and 17 recite parameter restoration in a general sense.

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The corresponding description in the specification only addresses restoration in the context of a fuel cell (e.g., page 9, lines 14-15, and page 12, lines 1-7). No description of what constitutes restoration in a non-fuel cell situation is provided.

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, it appears that the phrase "that falls" should be replaced with "falls".

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***Claim Rejections - 35 USC § 103***

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this

Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 1-3, 5-9, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Creger et al.

(US 2003/0088321 A1) (hereinafter (Creger)) in view of Kolmanovsky et al. (6,553,958) (hereinafter Kolmanovsky).

16. As per claim 1, Creger shows the invention substantially as claimed having an arrangement for controlling a system according to the deviation between the value measured on the system and the value estimated by means of a model of the controlled system of at least one control parameter (e.g., Figure 4), the arrangement comprising:

a neural network, which generates the estimation of said control



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parameter implementing said model (e.g., Figure 4, element 406)

and

an acquisition module for acquiring the actual value, as

measured on the controlled system, of a set of sensing

parameters comprising at least one from among said control

parameter and said characteristic parameters of the

controlled system (e.g., Figure 4, box 404); and

a variation module, which is sensitive to the variation of said

control parameter (e.g., Figure 4, box 408). Creger does not

specifically show said neural network implements said model as a

function of a set of characteristic parameters of the controlled

system and of respective configuration parameters of the neural

network and having associated thereto a training module, which

can train said neural network by modifying said configuration

parameters according to a set of updating data. However, it

would have been obvious to one of ordinary skill in the art at

the time the invention was made that the neural network could be

responsive to characteristic parameters as this is typical

neural network behavior and that it could have an associated

training module which can train said neural network by modifying

said configuration parameters according to a set of updating

data as the training of neural networks having modifiable

configuration parameters via a separate device by changing such

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items as weights therein is a well-known neural network mechanism. Creger further shows comparing the estimated parameter with the actual parameter (e.g., Figure 4, box 408) and updating the neural network model in response to variations in the compared data (e.g., Figure 4, box 410). Creger does not specifically show a variation module which is able to generate an update-enable signal when said control parameter falls outside a pre-set tolerance range, said acquisition module being sensitive to said update-enable signal for transferring to said training module, as said updating-data set, said set of sensing parameters. Kolmanovsky shows a variation module, which is sensitive to the variation of said control parameter and is able to modify the model when said control parameter falls outside a pre-set tolerance range (e.g., Figure 2, elements 132). Kolmanovsky also shows transferring the actual system value to the estimated system value (e.g., Figure 2, box 134) depending on the comparison result between estimated and actual system values. Kolmanovsky does not specifically show generating an update-enable signal. It would have been obvious to one of ordinary skill in the art at the time the invention was made that an update-enable signal could be generated according to the actual/estimated value comparison and that such signal could be

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directed to the acquisition module to provide the set of sensing parameter data to the training module. It would have been further obvious to one of ordinary skill in the art at the time the invention was made that the actual value/estimated value comparison system of Kolmanovsky could be utilized in the neural network modeling system of Creger in order to provide an enhanced and expanded capability thereto.

17. As per claim 2, it is rejected for reasons as given above for claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the acquisition module could comprise a truncation module for truncating the actual value of at least some of said characteristic parameters of the controlled system as truncation represents a well known mechanism for simplifying data where more extensive data precision is not needed or where integer value processing is performed as a particular circumstance warranted.

18. As per claim 3, it is rejected for reasons as given above for claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the acquisition module could comprise a memory for storage

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of at least one of the parameters of said set of sensing parameters as memories are well known mechanisms by which to store data as necessary for subsequent processing.

19. As per claim 5, as best understood, it is rejected for reason as given above for claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the acquisition module could comprise an input network for verifying whether said actual value, as measured on said controlled system, of at least one of said characteristic parameters of the controlled system that falls within an allowed range of variation as such an input network consisting of, for example, comparators, is well known to provide variation information with respect to data input thereto.

20. As per claim 6, it is rejected for reasons as given above for claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the acquisition module could comprise a sample-and-hold module for acquiring the value of said control parameter as sample-and-hold processing by their nature are inherently acquisition devices of signals applied thereto.

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21. As per claim 7, as best understood, it is rejected for reasons as given above for claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the variation module could comprise a restore module for restoring at least one parameter of the controlled system when said control parameter falls outside said pre-set tolerance range as restoration of any number of control system parameters to some desired value is a well known control system function as a particular circumstance warranted.

22. As per claim 8, it is rejected as being dependent upon rejected claim 7.

23. As per claim 9, it is rejected for reasons as given above for claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the variation module could be configured to detect the deviation, with respect to said tolerance range, of the difference between the current value of said control parameter and the respective mean value as the offset of a given data value from a corresponding mean value is a well known mechanism to express data variations.

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24. As per claim 14, it is rejected as being an essentially analogous method to the system of claim 1 and rejected for reasons given therefor.

25. As per claim 15, it is rejected for reasons as given above for claim 14 and for reasons similar to those given for claim 2 above.

26. As per claim 16, it is rejected for reasons as given above for claim 14 and for reasons similar to those given above for claim 5.

27. As per claim 17, as best understood, it is rejected for reasons as given above for claim 14 and for reasons similar to those given above for claim 7.

28. As per claim 18, it is rejected for reasons as given above for claim 14 and for reasons similar to those given above for claim 9.

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29. Claims 11-13, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Creger et al.

(US 2003/0088321 A1) (hereinafter (Creger) in view of Kolmanovsky et al. (6,553,958) (hereinafter Kolmanovsky) and in further view of Hochgraf (US 2003/0044658 A1) (hereinafter Hochgraf).

30. As per claim 11, it is rejected for reasons as given above for claim 1. Further, the combination of Creger and Kolmanovsky does not specifically show the use of that combination in a fuel cell. Hochgraf shows a fuel cell system with corresponding controller (e.g., Figure 2, element 22). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the combination of Creger and Kolmanovsky as the controller in the fuel cell system of Hochgraf to provide enhanced and expanded control capabilities thereto as a particular circumstance warranted.

31. As per claim 12, it is rejected for reason as given above for claim 11. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that said at least one control parameter could be represented by the voltage generated by said at least one fuel cell as the

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primary output of any fuel cell system is the voltage generated thereby.

32. As per claim 13, it is rejected for reasons as given above for claim 11. Further, the combination of Creger and Kolmanovsky does not specifically show that said

characteristic parameters of the controlled system could be chosen from the group consisting of:

the current generated by said at least one fuel cell, the quantity of air supplied to said at least one fuel cell, and the temperature of said at least one fuel cell. Hochgraf shows a fuel cell system with controller where control therein is dependent upon current drawn from said fuel cell, mass flow rate of air, and temperature of said fuel cell (e.g., Hochgraf, claim 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the mass flow rate of air recited in Hochgraf would thereby provide quantity of air data. It would have been further obvious to one of ordinary skill in the art at the time the invention was made to incorporate the combination of Creger and Kolmanovsky as the controller in the fuel cell system of Hochgraf to provide enhanced and expanded control capabilities thereto as a particular circumstance warranted.



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33. As per claim 20, it is rejected for reasons as given above for claim 14 and for reason similar to those given above for claim 11.


***Allowable Subject Matter***

34. Claims 4, 10, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas M. Shute whose telephone number is (571) 272-3690. The examiner can normally be reached on M-F 9:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on (571) 272-3687. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
September 15, 2005

  
**Anthony Knight**  
Supervisory Patent Examiner  
Group 3600